

May 11/80

US EPA RECORDS CENTER REGION 5



515772

to Dennis
Detkin
from M. Toepper

14 pages

No fax at U.S. Atty-Mn.
but FBI has a fax.

Mr. Francis X. Newman
Assistant U.S. Attorney
District of Minnesota
110 South Fourth Street Room 234
Minneapolis, Minnesota 55401

Dear Frank:

Regarding the ~~October~~ 9, 1980, meeting with Reilly, Tai and Chemical (Reilly), members of the U.S. EPA technical staff -- M. Toepper, D. Detkin and F. Biros -- feel that Reilly and their consultant, ~~ERT~~ Environmental Research and Technology (ERT), misrepresented or ignored the available information and consequently made false assumptions relating to the contamination of soils and groundwater in St. Louis Park (SLP). In this letter, we identify our concerns and the misrepresentation made by ERT.

All of the data presented ~~by ERT during~~ ^{by ERT} ~~the meeting~~ is publically available and had been generated through state and local agencies or their contractors. ERT has not independently generated any new information.

~~ERT's presentation goes here~~

Dr. F. McMichael began the technical presentation with a discussion of the basic difference in philosophy between the "public" and ~~ERT~~ 90 Mr. McMichael stated that the public expects removal of the source of contamination and thus protection of human health. ERT suggested an alternative method of treatment (hydrogen peroxide chemical oxidation rather than carbon adsorption) of the water supply to protect human health and leaving the contaminant source in the ground. In Mr. McMichael's view, this program is the most cost-
solution the protection

human health.

We question ERT's disregard for cleanup of the source of environmental contamination. It may be that it is more cost-effective over the long term to remove or isolate and contain the source of contamination. Source containment or removal would reduce the time period for treatment of potable waters.

(This information is being developed by Hickock and Associates through a contract with the Minnesota Department of Health (MDH) and information generated by the U.S. Geologic Survey's (U.S.GS) transport model.)

Croosote (coal tar) is a mixture of over 200 chemical compounds produced through the destructive distillation of coal. Croosote contains neutral oils, tar acids and tar bases.

Neutral oils include the polycyclic aromatic hydrocarbons (PAHs) and lighter molecular weight compounds such as benzene. PAHs are a large chemical class including carcinogens, co-carcinogens, tumor-promoters and tumor-initiators. ERT presented a table from the National Academy of Sciences (NAS) (1972) illustrating the relative carcinogenicity of certain PAHs. ~~REDACTED~~ The U.S.EPA Water Quality Criterion (WQC) for PAHs (1980) is more recent. A discussion of the carcinogenicity, co-carcinogenicity, synergisms and antagonisms of these compounds. Table 1, Column 1 is the information presented by ERT. Table 1, Column 2 ~~REDACTED~~ further identifies the gradations of carcinogenic activity of these PAHs and other PAHs detected in SLP that were not listed by ERT. The information in Column 2 is from the WQC and from another often quoted general toxicology reference by N. Loring Sawyer. 006191

Table 1. PAH Carcinogenicity

3

Chemical

ERT¹

U.S. EPA

2 carbon rings

2-methylnaphthalene

No rating

No rating³

Acenaphthalene

No rating

experimental tumor-initiator³

Biphenyl

No rating

experimental tumor-initiator³3 carbon rings

Fluorene

-

No rating³

Anthracene

-

Tumor-initiator²

Phenanthrene

-

experimental carcinogen³4 carbon rings

Benz(a)anthracene

+

Tumor-initiator²

Chrysene

±

experimental ~~carcinogen~~ carcinogen³

Fluoranthene*

-

Tumor-promotor²

Pyrene

-

(o-carcinogen, Tumor-promotor²)

9,10-benzanthracene

No rating

No rating³

1,2,6,7-tetrahydroxyphenanthrene

No rating

experimental carcinogen³5 carbon rings

Benz(a)pyrene*

++

carcinogen²

Benz(b)fluoranthene*

++

carcinogen²

Benz(j)fluoranthene

++

carcinogen²

Benz(k)fluoranthene*

++

carcinogen²

Dibenzanthracene

+

carcinogen²

006192

Other PAHs detected in SLP water supply and not listed by ERT-

Benz(e)pyrene

carcinogen²

Perylene (dibenz(a,h)anthracene)

experimental tumor-initiator³

Table f Continued

4

Benz(g,h,i) pyrene*

co-carcinogen²
No rating

+++ ~~not~~ very strong carcinogen
++ strong carcinogen
+ weak carcinogen
- not carcinogenic

¹ Particulate Polycyclic Organic Matter, NAS (1972)

² Ambient Water Quality Criteria for PAH, EPA-440/S-80-069 (1980)

³ Dangerous Properties of Industrial Materials, N.I. Sax (5th ed., 1979)

* PAHs listed in the WHO standard.

006193

The tar acids consist of the phenolic compounds such as phenols, cresols and other alcohols of benzene. Phenolic compounds are toxic causing denaturation of cellular proteins. Phenol is a demonstrated tumor-promotor in staged exposure with benz(a)pyrene. [Van Denen, B.L., "Tumor-promoting and Co-Carcinogenic Agents in Chemical Carcinogenesis" in C.E. Searle (ed.), Chemical Carcinogens, ACS Monographs #172, American Chemical Society, Washington, D.C. (1976) 24.]

The tar bases consist of acridines, pyridines, quinolines and naphthylamines. Acridines are very strong skin irritants and photo-sensitizers. Pyridines less so. Quinolines are retrotoxic. Several naphthylamines are demonstrated human carcinogens and are present in creosote.

ERT focused on PAHs in the water supply of SLP. They failed to present the possible health implications of other coal tar compounds as described above. There was no mention of phenol concentrations in the water supply of SLP. Data collected on phenol concentration is the historic basis for the SLP contamination problem. To date, ~~concentrations~~ analyses for tar bases have not been ~~completed~~. Samples (four) taken during the summer of 1980 from SLP municipal wells are being analyzed for tar base compound concentrations by U.S. EPA. Also, future work will include analyses for tar bases.

ERT further limited their discussion of the significance of PAH contamination in the SLP water supply to six PAHs. The six PAHs are: fluoranthene (Fl), benz(a)pyrene (BaP), benz(k)fluoranthene (~~BkF~~) (BkFl), benz(b)fluoranthene (BbFl), o-phenylendiphenylene (ipp) and benz(g,h,i)perylene (BPR). The six PAHs were chosen by ERT because these six compounds ~~constitute~~ constitute the PAHs of the World Health Organization (WHO) water quality standard of 1976. The WHO standard is 200 mg/l (ppt) the concentration of the six PAHs listed

above. The standard does not address other PAHs which are carcinogenic, co-carcinogenic, tumor-initiators and tumor-promoters. The WHO standard was developed with the realization that there are many different PAHs (greater than 100), but the technology was not available for the analysis of each compound. Therefore, Fl, BaP, BkFl, BbFl, ipp, and BPR were chosen as qualitative representatives of the PAH class for monitoring purposes.

U.S. EPA has very recently, (October, 1980) developed a WQC for PAHs. The rationale for the WQC is: "For the maximum protection of human health from the potential carcinogenic effects due to exposure of polynuclear aromatic hydrocarbons through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time." Therefore, the levels which may result in incremental increase of cancer risk over the lifetime estimated at 10^{-6} (1 cancer victim: 1,000,000 persons) corresponds to a recommended criterion of 2.8 ng/l (ppt) ~~for~~ (ingestion of water).

ERT presented several tables and figures summarizing the PAH contamination in the SLP water supply. Table 2 is the summary table of PAH concentrations presented by ERT. ERT concluded that only SLP wells Nos. 10 and 15 are contaminated sufficiently to necessitate water treatment. However, this analysis used only the 6 WHO PAHs (Table 2, Column 4), not total PAH. The analytic techniques being used screen for 21 PAHs and Table 3 lists the compounds which have been detected in each of the 0.06195 closed municipal wells. If the concentration of PAHs are used to determine whether a municipal supply well should be closed, we feel that total PAH concentration should be used and not only the six WHO PAHs. The decision-making standard therefore would ~~be~~ not be 200 (~~WHO-6 PAHs~~), 2.8 ppt

start 1/16/96
1

Table 2. PAH concentrations in SLP wells

(ERT interpretation)

Aquifer

St. Peter

Prairie du Chien-Indian

Winckley

1.	2. Well No.	3. No. of samples	4. WHO PAHs (ppt)	5. hi-low range detected PAHs (ppt)	6. iron treatment
	3	1	<32	66-305	Yes
	4*	21	2-70	73-1170	No
	5	1	5-32	10-280	No
	6	16	<32	8-320	Yes
	7*	4	<53	205-450	No
	8	2	<32	<280	Yes
	9*	1	<53	<280	No
	10*	2	750-800	2540-4670	Yes
	11	4	6-20	40-180	Yes
	12	8	190-910	2100-5610	Yes
	13	2	<32	4-280	Yes
			5-41	5-270	Yes
			<32	70-290	Yes
			<36	5-270	Yes

* wells closed by MDH because of PAH contamination
 PAH contaminated > 200 ppt (WHO standard)

006196

Table 3. List of PAHs Detected in Each of Closed SLP Municipal Supply Wells

* WHO PAHs

<u>Well no. 4</u>		total	16
2-methyl naphthalene			
ace naphthalene		WHO	9
biphenyl			
anthracene			
phenanthrene			
pyrene			
fluoranthene *			
benzo(k) fluoranthene *			
benzo(a) pyrene *			
benzo(g,h,i) pyrene *			
1,2,6,7- tetrahydronaprene			
benzo(e) pyrene			
1,2,3,4-dibenzanthracene			
chrysene			
fluorene			
9,10- benzoanthracene			
<u>Well No. 7</u>		total	11
2-methyl naphthalene			
biphenyl		WHO	2
anthracene			
pyrene			
fluoranthene *			
benzo(b) fluoranthene *			
1,2,5,6			
perylene			
acenaphthalene			
1,2,6,7-tetra naprene			
fluorene			
			006197

Table 3. (continued)

Well no. 9

benzo(a) pyrene *
 biphenyl
 anthracene
 phenanthrene
 fluoranthene *
 pyrene
 pentene

total 1
 WHO 2

Well no. 10

anthracene
 phenanthrene
 fluoranthene *
 fluorene
 1,2-benzanthracene
 9,10-benzphenanthrene
 benzo(k) fluoranthene *
 1,2,3,4-dibenzanthracene
 biphenyl
 pyrene
 benzo(a) pyrene *

total 11
 WHO 3

Well no. 15

phenanthrene
 benzo(a) pyrene *
 1,2,3,4-dibenzanthracene
 chrysene
 pyrene
 anthracene
 fluorene
 fluoranthene *

total 12
 WHO 3
 006198

1,2-benzanthracene
 acenaphthalene
 benzo(j) fluoranthene *
 9,10-phenanthrene

10

(EPA - total PAHs). Using the EPA WQC all of the ^{SLP} municipal supply wells are contaminated with PAHs.

ERT argued that Kelly was not responsible for the PAH contamination. ERT proposed that PAH contaminants are immobile and that the contamination of any well was caused by a localized source of PAH. Such conclusion warrant comment for several reasons.

First, wells nos. 10 and 15 are located to the northeast of the Kelly site. ERT stated that these are the only two wells necessitating clean-up. The general direction of groundwater ^{movement in this area is} ~~moves~~ southeasterly. It is interesting that Kelly is willing to pay for cleanup of wells to the northeast when ground water moves southeasterly. Mr. McMichael based his conclusion on the assumption that PAH movement is negligible. According to McMichael's analysis, any pollutant movement would be to the SE.

~~New~~ ~~face~~ Second, Mr. Michael stated that pollutant movement is determined by aqueous solubility (chemical) and particle sorption (physical). McMichael proposed that because PAHs are relatively insoluble and particle movement is minimal, the PAH pollutant plume is immobile. He failed to mention the possibility of ~~other~~ PAH ^{migration} through a hydrocarbon phase. Hydrocarbon phase movement may occur through two mechanisms— 1) migration of a hydrocarbon plume which more dense or lighter than water (See Figure 1.) and 2) migration of hydrocarbon contaminants through organic material micelles. This latter theory is supported by the available data. U.S. GS has conducted several preliminary pumping tests which will be summarized in the report to be published November, 1980. The data demonstrate that the PAH contaminants move through the aquifer more rapidly than expected from diffusion and ~~are~~ are ~~not~~ ⁰⁰⁶¹⁹⁹ taken by pumping. Recent data from simple MDA also at this SLP Well no. 5 (due west of the

Rudding site) monthly ~~had~~ increased concentrations of PAHs. The hypothesis is that the plume of contaminants is moving toward the well heads being pumped most heavily. These areas are ~~now~~ now in the western hemisphere of superbacon. Large production wells of the eastern hemisphere of SIC (SIC wells nos. 4, 7, 9, 10 and 15) have been closed.

ERT suggested ~~that~~ other localized sources have caused the PAH contamination of the SIC water supply. Table 4 lists the sources of PAH contamination that ERT presented to us. These sources have been and continue to be investigated by U.S.GS and the Minnesota Pollution Control Agency (MPCA). There is the possibility that some of these companies have joint and several responsibility with Rudding for causing the contamination of the groundwater of SIC. We believe, as do other experts, that Rudding was the major contributor to the contamination of the groundwater.

ERT suggested peroxide treatment for specific removal of PAHs. The reason ERT selected peroxide treatment were fourfold: 1) cost-effectiveness, 2) specificity, 3) applicability for intermittent use, and 4) previous effective demonstration. ERT also stated however that direct experimental investigation would be necessary to validate peroxide treatment. We agree that a pilot study will be necessary if peroxide treatment is used.

006200

Peroxide treatment requires a catalyst. This may be iron or ultra-violet radiation (UV). The data presented by ERT, Removal of Organic Matter from Water by UV and H_2O_2 , L. Berglund, et al., in EPA - 590/9-7A-020, ~~Water Plant~~ after Treatment project (1979), used hydrogen ide (H_2O_2) and UV treatment.

Table 4. Sources of PAH Contamination in SLP

city dumps and land fills	(5)
paving and roofing companies	(5)
coal and fuel dealers	(4)
miscellaneous	(5)
- Flame	
- D+A Lubricants	
- Golden Auto Parts	
- Presto Lite	
- Androz	
rubber manufacturing companies	(3)
non-site specific	(3)
- septic tanks	
- road tars	
- railroads	

Numbers in parentheses are the number of sources in each category.

006201

ERT failed to mention that UV radiation was used in this study. The 98% destruction efficiency ERT referenced requires a 20 residence time of four hours with UV radiation plus H_2O_2 . Again, iron may be used as a catalyst but the treatment system is experimental for the water concentrations typical of SRF and would require a pilot plant study.

There are alternative options for organic contaminant removal such as carbon adsorption which we feel may ~~need~~ further consideration by Rilly. ERT commented that carbon adsorption was capital intensive and non-specific for PAH. Calgon has developed an activated carbon which is specific for large organic molecules, such as creosote compounds. The state-of-the-art is more refined than suggested by ERT. Carbon adsorption can be used in a portable system which reduces capital investment. And, the spent carbon can be regenerated and reused. As stated earlier, source removal or isolation and containment may be a cost-effective remedy as opposed to drinking water treatment for a remaining infinite time period.

Hopefully ~~this~~ the discussion above will clarify the concerns we expressed ~~briefly~~ to you after the Rilly-ERT presentation. If you have any further questions, please do not hesitate to call.

Sincerely -

 M. Repper

cc: Alan Hindmarch (sp?)
Dick Koppy
Rich Ferguson

bcc: Leineniger
Toepfer
Dunkin 006202
~~Leineniger~~
~~Toepfer~~
~~Dunkin~~
Bios

1st meeting

Ridley - USEPA

HST 10/1/80

~~major cost~~ \$ 20,000 was needed
input was 1st priority - modelling
Dick Koppy
Dick Ferguson 246-7785
10/9/80 Ridley Attn. U.S. Atty Office
BIS

①

→ Beginning remarks

→ Apology / spatial arrangement
→ Settlement conference
→ Need discussion

Why presented in causal discussion
Overview of Ridley (2 weeks ago) stay thing

problems — (life cycle)
problems —

1) us giving imminent & substantial endangerment to pub. health?
2) has Ridley committed a tort?

Solvents Recovery →

Vertec

DNA's - ubiquitous

to sources in sup
DNA's / phenols → combustion products
VP Number - "Sonic killer of pest"

common law nuisance

— history of operations

— state of art

— negligence

— bid

— liability cause problem

3) statute of limitations

J. Caine - factored

when did damage occur

5) Ridley v. SLP - responsibility of remedial measures

piece to get rid of Ridley was responsibility
for cleanup of site

006204

6) models

Ridley preferred that state folks were used to the
explanation + better will remedy

non treatment

A1, B1, P,
 BKF1,
 b, PAHs, benzo-Pe
 (benz) bbF1
 not analyzed (n)
 here

Well no.		WHO	PPM	iron treat
	<u>3</u>	1	<32	66 - 305
-	4	21	2-70	73 - 1170
	5	1	5-32	10 - 280
	6	16	<32	8 - 320
-	7	4	<53	205 - 450
	8	2	<32	<280
-	9	1	<53	<280
	10	2	750 - 880	250 - 4670
	14	4	6-20	40 - 180
	15	8	190 - 910	2100 - 51610
	<u>16</u>	2	<32	<280
	11	3	5-41	5 - 270
	12	2	<32	70 - 290
	13	4	<36	5 - 270
				highest & lowest
			total 71	

k. sum of specific PAH analysis (11-20) upper bound results from assigning a conc. equal to the detection limit for results reported below detection. Lower bound results by assigning zero to results reported below detection

non treatederation + flocculation
 reduction via high pressure sand filtration
 reduction to prevent deposition & leaching in
 consumer lines
 chlorination + fluoridation all wells
 (State reg.)

006206

(3)

table

total car comparison of PAH exposure from
drinking H₂O (water) vs.
food, cigarette validation / ambient air

	24 - 16 mg day (2 liters/day)	16 - 16 mg total
A		
Fl		
PY		
BaP		
PAH Total		

Pattillo Price, 1980
A. Bijlsma & A.J. Dennis (eds)
PAH: Chemistry + Biologic Effects

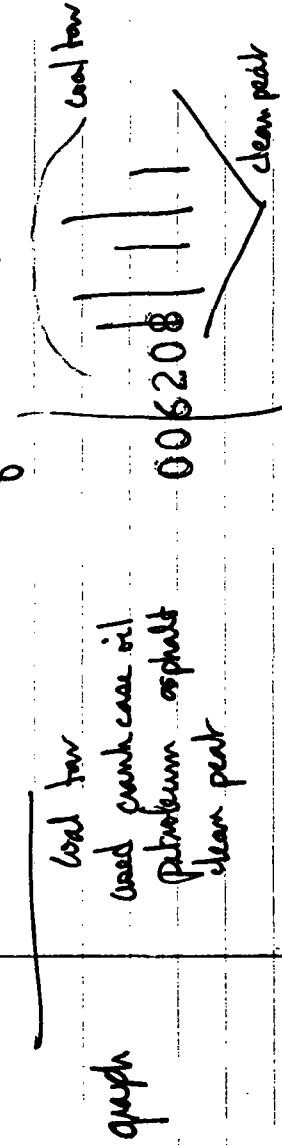
table

range of PAH levels in foodstuff

"Human Exposure to PAH's" in Carcinogenesis, A Comprehensive Survey vol. I

1. Fossilfuels

problems treatment of materials close to the levels of detectability



(4)

treatment

④ finished water quality - SLP area
 blending
 MDT report - before & after / high pressure filtration
 $2\frac{1}{2}$ gpm ft² rate ↓ 84% removal

→ powdered activated carbon

PAHs - slightly soluble & hydrophobic

expensive, regardless of organic
designed for TOC

2-5 ppm TOC

2-5 ppb PAH

some systems selective

chemical oxidation

w/ H₂O₂

(higher conc. coke plants) commercial facilities
worth further invest.

not capital intensive

2 lig. streams

design from direct exp.

EPA - 570/9-79-020

W. Germany

England, Gjessing + Skipperud (1979)

$$\frac{C_0 - C}{C_0} = e^{-kt} \quad k = 0.018 \text{ min}^{-1}$$

H₂O₂: PAH
2:1
BaP - PAH
ppb - ppm

H₂O₂ Crucible Steel Co. → not measuring
no sludge PAH's

Berg - thoughtful presentation thank you
treatment is part of the solution
treatment - affect on plume movement

table

aqueous

solubility w/ H₂O
plume movement in H₂O

006210

1) aqueous

2) particle movement (sorption)

post mtg.
USEPA / us Atty

what

big picture procedure
joint effort -

(S) they're willing to do more than presented

how to proceed?

consent decree

- 1) admission
- 2) study of problem w/ remedial plans

Really worth soot



MPCA → \$5-10 million

analysis / evaluation of meeting

006212

List of Attendees at Meeting at U.S. Attorney's Office on
October 9, 1980 - 9:00 a.m.

I. United States Government

Thomas K. Berg
United States Attorney
(612) 332-8961

Francis X. Hermann
Assistant U.S. Attorney
(612) 332-8961

Melanie S. Toepfer
Environmental Scientist
EPA (Chicago)
(312) 353-2110

Robert Leininger
Attorney
EPA (Chicago)
886-6720

Frank Biros
Chemist
Hazardous Waste
EPA (Washington, D.C.)
(202) 426-8710

Dennis Devlin
Tech. Staff (Environmental Eng.)
Washington, D.C.
(202) 472-3500

Fred Stiehl
Attorney
EPA (Washington, D.C.)
(202) 426-8710

II. State of Minnesota

Stephen Shakman
Assistant Attorney General
296-7703

Lovell Richie
MPCA
296-7339

Dennis Coyne
Assistant Attorney General
296-7702

Dr. Roger DeRoos
Minnesota Department of Health
296-5320

Bill Miller
Assistant Attorney General
341-7272 (Rep. MN Dept.
Health)

Jay Heffern
MPCA
296-7305

III. St. Louis Park

Dick Koppy
Director of Public Works
920-3000
*5005 Minnetonka Blvd.
SLP, Minnesota 55416*

Allen Hinderaker
St. Louis Park City Attorney
335-9331

4344 IDS Minneapolis, MN
SS402

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer
Attorney
Dorsey Law Firm
(612) 340-~~2745~~
2825

William J. Koeppel
Attorney
Dorsey Law Firm
(612) 340-2745

005213

IV. Reilly Tar and Chemical Corporation - (Continued)

Mr. Polack
General Counsel, Reilly Tar and
Chemical Corporation
(317) 638-7531

Dr. Francis Clay McMichael
ERT, Inc.
(412) 261-2910

John C. Craun
ERT, Inc.
(412) 261-2910

Dr. Robert W. Dunlap
ERT, Inc.
(617) 369-8910

006214

11/4

get natural peat samples

SIP well head report

005215

List of Attendees at Meeting at U.S. Attorney's Office on
October 9, 1980 - 9:00 A.M.

I. United States Government

✓ Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.) (Washington, D.C.)
Fred Stiehl - Attorney - EPA (Washington, D. C.)

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General. MPCA
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General MDH
Jay Heffern - MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works
Allen Hinderander - Atty city of St. Louis Park

IV. Reilly Tar and Chemical Corporation

✓ Ed Schwartzbauer - Attorney } outside Dunay
William Kappel - Attorney }
Mr. Polack - General Counsel, Reilly Tar and Chemical Corporation
Francis Mr. f. McMichael - ERT, INC. Tech
John Mr. Craun - ERT, INC.
Bob Mr. Dunlap - ERT, INC. VP

006216

List of Attendees at Meeting at U.S. Attorney's Office on
October 9, 1980 - 9:00 A.M.

I. United States Government

Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.)
Fred Shick - Atty. Attorney

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General
JAY HEFFERN - MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer - Attorney
William Koeppel - Attorney
Mr. Pollack - General Counsel, Reilly Tar and Chemical Corporation
Mr. McMichael - ERT, INC.
Mr. Craun - ERT, INC.
Mr. Dunlop - ERT, INC.

005217

BAP < .87
 PA < 1.9
 1,2,3,4 DBA < 2.5
 CH 34
 P 2700
 BP < 6.5
 A 120
 F 11
 FI 790
 1,2 BA < 3
 Ace 2700
 BjFI 2.1
 9,10 BA < 2

~~4,13,10,11~~

6.13.80

hi — 5980
low — 2100

(4)

1150 — hi

15 — low

~~14 1086 8081~~

1.9.80

~~5.30 75.0~~

5.30 low

4	2MN	200	8.29
	Ace	530	
	BP	99	
	A	< 1.5	128.3
	PA	120	
	FI	6.8	
	P	214	25
	BkFI	< 2.5	
	Bap	< 8.5	
	BPR	< 14	169.3
	1,2,6,7 ThP	< 15	
	BeP	< 7.3	1152.1
	1,2,3,4 DBA	< 7.5	
	CH	4	
	F	120	
	9,10 BPA	< 2.0	

006218

Table 3. List of PAHs Detected in Each of Closed SLP Municipal Supply Wells
 * WHO PAHs

Well no. 4

		Total	WHO
2-methyl naphthalene		16	
ace naphthalene			4
biphenyl			
anthracene			
phenanthrene			
pyrene			
fluoranthene *			
benzo(k) fluoranthene*			
benzo(a) pyrene *			
benzo(g,h,i) pyrene*			
1,2,6,7- tetrahydronaphe			
benz(e) pyrene			
1,2,3,4-dibenzanthracene			
chrysene			
fluorene			
9,10- benzophenanthrene			

Well No. 7

		Total	WHO
2-methyl naphthalene		11	
biphenyl			2
anthracene			
pyrene			
fluoranthene *			
benzo(b) fluoranthene*			
1,2,5,6			
perylene			
acenaphthalene			

006197
 1,2,6,7- tetra hydronaphe
 fluorene

Table 3. (continued)

Well no. 9

benzo(a) pyrene *
 biphenyl
 anthracene
 phenanthrene
 fluoranthene *
 pyrene
 pentene

total 7
 WHO 2

Well no. 10

anthracene
 phenanthrene
 fluoranthene *
 fluorene
 1,2-benzanthracene
 9,10-benzphenanthrene
 benzo(k)fluoranthene *
 1,2,3,4-dibenzanthracene
 biphenyl
 pyrene
 benzo(a)pyrene *

total 11
 WHO 3

Well no. 15

phenanthrene
 benzo(a)pyrene *
 1,2,3,4-dibenzanthracene
 chrysene
 pyrene
 anthracene
 fluorene
 fluoranthene *

total 12
 WHO 3
 006198

1,2-benzanthracene
 acenaphthalene
 benzo(j)fluoranthene *
 9,10-phenanthrene

(EPA- total PAHs). Using the EPA WQC all of the ^{SP} municipal supply wells are contaminated with PAHs.

ERT argued that Rilly was not responsible for the PAH contamination. ERT proposed that PAH contaminants are immobile and that the contamination of any well was caused by a localized source of PAH. Such conclusions warrant comment for several reasons.

First, wells nos. 10 and 15 are located to the northeast of the Rilly site. ERT stated that these are the only two wells necessitating clean-up. The general direction of groundwater ^{movement in this area is} southeasterly. It is interesting that Rilly is willing to pay for cleanup of wells to the northeast when groundwater moves southeasterly. Mr. McMichael based this conclusion on the assumption that PAH movement is negligible. According to McMichael's analysis, any pollutant movement would be to the SE.

~~New~~ ~~face~~ Second, Mr. Michael stated that pollutant movement is determined by aqueous solubility (chemical) and particle sorption (physical). McMichael proposed that because PAHs are relatively insoluble and particle movement is minimal, the PAH pollutant plume is immobile. He failed to mention the possibility of ~~other~~ PAH ^{migration} through a hydrocarbon phase. Hydrocarbon phase movement may occur through two mechanisms— 1) migration of a hydrocarbon plume which more dense or lighter than water (See Figure 1.) and 2) migration of hydrocarbon contaminants through organic material micelles. This latter theory is supported by the available data. U.S. GS has conducted several preliminary pumping tests which will be summarized in the report to be published November, 1980. The data demonstrate that the PAH contaminants move through the aquifer more rapidly than expected from diffusion and ~~are~~ are ^{stirred} by pumping. Recent data from simple MD also at this ⁰⁰⁶¹⁹⁹ SP Well no. 5 (due west of the

Reilly site) recently ~~had~~ increased concentrations of PAHs. The hypothesis is that the plume of contaminants is moving toward the well heads being pumped most heavily. These areas are ~~all~~ now in the western hemisphere of SLP because large production wells of the eastern hemisphere of SLP (SLP wells nos. 4, 7, 9, 10 and 15) have been closed.

ERT suggested ~~testified~~ that other localized sources have caused the PAH contamination of the SLP water supply. Table 4 lists the sources of PAH contamination that ERT presented to us. These sources have been and continue to be investigated by U.S.GS and the Minnesota Pollution Control Agency (MPCA). There is the possibility that some of these companies have joint and severable responsibility with Reilly for causing the contamination of the groundwater of SLP. We believe, as do other experts, that Reilly was the major contributor to the contamination of the groundwater.

ERT suggested peroxide treatment for specific removal of PAHs. The reason ERT selected peroxide treatment were fourfold: 1) cost-effectiveness, 2) specificity, 3) capabilities for intermittent use, and 4) previous effective demonstration. ERT also stated however that direct experimental investigation would be necessary to validate peroxide treatment. We agree that a pilot study will be necessary if peroxide treatment is used.

006200

Peroxide treatment requires a catalyst. This may be iron or ultra-violet radiation (in The data presented by ERT, "Removal of Organic Matter from Water by UV and H_2O_2 ", L. Berglund, et al., in EPA - 590/9-74-020, ~~etc.~~
Oxidation Treatment Water Pilot Project (1974), was hydrogen ide (H_2O_2) and UV treatment.

Table 1. Sources of PAH Contamination in SLP

city dumps and land fills	(5)
paving and roofing companies	(5)
coal and fuel dealers	(4)
miscellaneous	(5)
- Flame	
- D+A Lubricants	
- Golden Auto Paint	
- Presto Lite	
- Androz	
rubber manufacturing companies	(3)
non-site specific	(3)
- septic tanks	
- road tar	
- railroads	

Numbers in parentheses are the number of sources in each category.

ERT failed to mention that UV radiation was used in this study. The 98% destruction efficiency ERT referenced requires a ~~of~~ residence time of four hours with UV radiation ~~plus~~ ^{plus} H₂O₂. Again, iron may be used as a catalyst but the treatment system is experimental for the inlet concentrations typical of SLP and would require a pilot plant study.

There are alternative systems for organic contaminant removal such as carbon adsorption which we feel may ^{need} further consideration by Reilly. ERT commented that carbon adsorption was capital intensive and nonspecific for PAH. Calgon has developed an activated carbon which is specific for large organic molecules, such as creosote compounds. The state-of-the-art is more refined than suggested by ERT. Carbon adsorption can be used in a portable system which reduces capital investment. And, the spent carbon can be regenerated and reused. As stated earlier, source removal or isolation and containment may be a cost-effective remedy as opposed to drinking water treatment for a seemingly infinite time period.

Hopefully ~~this~~ the discussion above will clarify the concerns we expressed briefly to you after the Reilly-ERT presentation. If you have any further questions, please do not hesitate to call.

Sincerely -

M.X.R.
Toepfer

cc: Erica Dolgin
Steve Shakman
Rich Ferguson

Alan Hindmarcher (sp?)
Dick Koppy

bcc: Leisinger
Toepfer
Devin 006202
Bios

~~Leisinger et al.~~

KST 10/7/80

1st meeting

Reilly - USEPA

~~tractor pool~~
~~airport~~
Dick Koppy
Rick Ferguson 296-7735
10/9/80

\$ 20,000 was needed
was 1st priority - modelling

①
Reilly Mtg. U.S. Atty Office
BIS

← Bay opening remarks
too apologetic
location / spatial arrangement
Schwartzbauer - settlement conference
off record discussion

mtg precipitated in casual discussion
overview of mtg (2 weeks ago) stay thing

problems — (it's everybody)

- 1) us proving imminent + substantial endangerment to pub. he
2) has Reilly committed a tort?

Solvents Recovery
Vertac

common law nuisance

— history of operations

— state of art

— negligence

3) did Reilly cause problem

4) statute of limitations

J. Caine - factual
when did damage occur

5) Reilly v. SLP - responsibility for remedial
measures

price to get rid of Reilly was responsibility
for cleanup of site

6) remedies

006204

PNA's - carcinogenicity
abiguities

20 sources in air

PNA's / phenols → combustion products

VP Mondale - "Sane habit of peat"

Reilly perceived that state folks were wed to the
excavation + barrier wall remedy

iron treatment

A1, B1, P,
 BKF1,
 b, PAHs, benzo, PE
 (benz) DPP
 (benz) bbF1
 unanalyzed
 here

Well no.		WHO	PPT	iron treat ment
	<u>3</u>	1	<32	66 - 305
-	4	21	2-70	73 - 1170
	5	1	5-32	10 - 280
	6	16	<32	8 - 320
-	7	4	<53	205 - 450
	8	2	<32	<280
-	9	1	<53	<280
	<u>10</u>	2	750 - 880	250 - 4670
	14	4	6-20	40 - 180
	<u>15</u>	8	190 - 910	2100 - 5610
	<u>16</u>	2	<32	<280
	11	3	5-41	5 - 270
	12	2	<32	70 - 290
	13	4	<36	5 - 270
				highest & lowest
			total	71

K. sum of specific PAH analysis (11-20) upper bound results from assigning a conc. equal to the detection limit for results reported below detection. Lower bound results by assigning zero to results reported below detection

iron content + aeration + flocculation
 reduction via high pressure sand filtration
 reduction to prevent deposition & coloring in
 consumer uses
 chlorination + fluoridation all wells
 (State reg.)

006206

table

worst case comparison of PAH exposure from
drinking H₂O (untreated, sup w/IS) v.
food, cigarette inhalation / ambient air

2.6 - 16	ug/l day	(2 liters day)	± 15
1.6 - 16		food	
A			
F			
P			
BaP			
PAH total			

Battelle Press, 1980

A. Bjorseth + A.J. Dennis (eds)

PAH: Chemistry & Biologic Effects

table

range of PAH levels in foodstuff

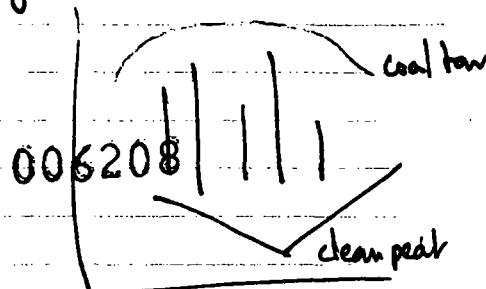
"Human Exposures to PAH's" in Carcinogenesis, A Comprehensive Survey vol. 1

I. Freudenthal

problems treatment of materials
close to the levels of detectability

graph

coal tar
used crankcase oil
petroleum asphalt
clean peat



treatment

finished water quality - SLP area
 blending
 MDT report - before & after / high pressure filtration
 $2\frac{1}{2}$ gpm ft² rate 84% removal

→ powdered activated carbon

PAHs - slightly soluble & hydrophobic

expensive, regardless of organic
designed for TOC

2-5 ppm TOC

2-5 ppb PAH

some systems selective chemical oxidation

w/ H₂O₂

(higher conc. coke plants) commercial facilities
worth further invest.

not capital intensive

2 lig. streams

design from direct exp.

EPA - 570/9-79-020

W. Germany

England, Griesheim + Shropshire (1979)

$$\frac{C_0 - C}{C_0} = e^{-kt} \quad k = 0.018 \text{ min}^{-1}$$

C₀

H₂O₂ Crucible Steel Co.

no sludge

→ not measuring
PAH's

Berg - thoughtful presentation thank you

treatment is part of the solution

treatment - affect on plume movement

table

aqueous

solubility w/g/l
plume movement in H₂O

006210

1) aqueous

2) particle movement (sorption)

H₂O₂: PAH
2:1
BaP - PAH
ppb - ppm

(S)

post mtg.
USEPA / us Atty

what

big picture procedure
joint effort -

they're willing to do more than presented

how to proceed?

consent decree

- 1) admission
- 2) study of problem w/ remedial plans

Really worth soot



MEPA → * 5-10 Mill ion

analysis / evaluation of meeting

006212

List of Attendees at Meeting at U.S. Attorney's Office on
October 9, 1980 - 9:00 a.m.

I. United States Government

Thomas K. Berg
United States Attorney
(612) 332-8961

Melanie S. Toepfer
Environmental Scientist
EPA (Chicago)
(312) 353-2110

Frank Biros
Chemist
Hazardous Waste
EPA (Washington, D.C.)
(202) 426-8710

Fred Stiehl
Attorney
EPA (Washington, D.C.)
(202) 426-8710

Francis X. Hermann
Assistant U.S. Attorney
(612) 332-8961

Robert Leininger
Attorney
EPA (Chicago)
886-6720

Dennis Devlin
Tech. Staff (Environmental Eng.)
Washington, D.C.
(202) 472-3500

II. State of Minnesota

Stephen Shakman
Assistant Attorney General
296-7703

Dennis Coyne
Assistant Attorney General
296-7702

Bill Miller
Assistant Attorney General
341-7272 (Rep. MN Dept.
Health)

Lovell Richie
MPCA
296-7339

Dr. Roger DeRoos
Minnesota Department of Health
296-5320

Jay Heffern
MPCA
296-7305

III. St. Louis Park

Dick Koppy
Director of Public Works
920-3000
*5005 Minnesota Ave.
SLP, Minnesota 55416*

Allen Hinderaker
St. Louis Park City Attorney
335-9331

4344 1DS Minneapolis, MN
SS402

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer
Attorney
Dorsey Law Firm
(612) 340-2745
2825

William J. Kappel
Attorney
Dorsey Law Firm
(612) 340-2745

005213

IV. Reilly Tar and Chemical Corporation - (Continued)

Mr. Polack
General Counsel, Reilly Tar and
Chemical Corporation
(317) 638-7531

Dr. Francis Clay McMichael
ERT, Inc.
(412) 261-2910

John C. Craun
ERT, Inc.
(412) 261-2910

Dr. Robert W. Dunlap
ERT, Inc.
(617) 369-8910

006214

4/4

get natural peat samples

SP well head report

005215

List of Attendees at Meeting at U.S. Attorney's Office on
October 9, 1980 - 9:00 A.M.

I. United States Government

✓ Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
Dennis Devlin - Tech. Staff (Environmental Eng.) (Washington, D.C.)
Fred Stiehl - Attorney - EPA (Washington, D. C.)

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General. MPCA
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General MDH
Jay Heffern - MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works
Allen Hinderander - Atty city of St. Louis Park

IV. Reilly Tar and Chemical Corporation

✓ Ed Schwartzbauer - Attorney } outside Dunay
William Kreppel - Attorney }
Mr. Polack - General Counsel, Reilly Tar and Chemical Corporation
Francis Mr. f. McMichael - ERT, INC. Tech
John Mr. Craun - ERT, INC.
Bob Mr. Dunlap - ERT, INC. VP

006216

List of Attendees at Meeting at U.S. Attorney's Office on
October 9, 1980 - 9:00 A.M.

I. United States Government

Thomas K. Berg - United States Attorney
Francis X. Hermann - Assistant U.S. Attorney
Melanie S. Toepfer - Environmental Scientist, EPA (Chicago)
Robert Leininger - Attorney, EPA (Chicago)
Frank Biros - Chemist, Hazardous Waste, EPA (Washington, D. C.)
~~Dennis Devlin - Tech Staff (Environmental Eng.)~~
~~Fred Shiehl - Attn. Attorney~~

II. State of Minnesota

Stephen Shakman - Assistant Attorney General
Lovell Richie - MPCA
Dennis Coyne - Assistant Attorney General
Dr. Roger DeRoos - Minnesota Department of Health
Bill Miller - Assistant Attorney General
JAY HEFFERN - MPCA

III. St. Louis Park

Dick Koppy - Director of Public Works

IV. Reilly Tar and Chemical Corporation

Ed Schwartzbauer - Attorney
William Koepel - Attorney
Mr. Pollack - General Counsel, Reilly Tar and Chemical Corporation
Mr. McMichael - ERT, INC.
Mr. Craun - ERT, INC.
Mr. Dunlop - ERT, INC.

005217

BAP <.81
 PA <1.9
 1234 DBA <2.5
 CH 34
 P 2300
 BP <6.5
 A 120
 F 11
 FI 790
 1,2 BA <3
 Ace 2700
 BjFI 2.1
 9,10 BA <2

~~4,10,11,12~~

6.13.80

hi — 5980
low — 2100

(15)

~~5000~~

(4)

1150 — hi

15 — low

~~10/10/86 8/8/87~~

1.9.80

~~5.10
7.7.0~~

~~5.3.0 low~~

4 2MN 200
 Ace 530
 BP 99
 A <1.5
 PA 120
 FI 6.8
 P <14
 BkFI <2.5
 BaP <8.5
 BPR <14
 1,2,6,7 THP <15
 BeP <7.3
 1234 DBA <7.5
 CH 4
 F 120
 9,10 BPA <2.0

8.29

128.3

25

169.3

1152.1

006218